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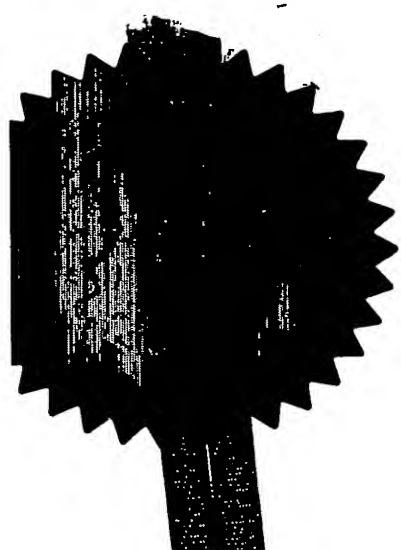
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19DEC02 EP 2236-1 000859
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2. Patent application number (The Patent Office will fill in this part)	0229562.4		
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Patents ADP number (if you know it)			
If the applicant is a corporate body, give the country/state of its incorporation			
4. Title of the invention	ROTARY CULTIVATOR		
5. Name of your agent (if you have one)	Anthony Cundy & Co.		
"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)	1 Olton Bridge 245 Warwick Road Solihull B92 7AH		
Patents ADP number (if you know it)	00002188001		
6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number (if you know it)	Date of filing (day / month / year)
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Description 6

Claim(s) 3

Abstract

Drawing(s) 4 + 4

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Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77) No

Request for preliminary examination and search (Patents Form 9/77) 1

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

I/We request the grant of a patent on the basis of this application

Signature

Anthony Cunniff & Co.

Date

16/12/2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Peter Watts
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ROTARY CULTIVATOR

The present invention relates to rotary cultivators and in particular to rotary cultivators powered by electric motor means.

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Rotary cultivators have been proposed in the past in which a ground engaging cultivator tool is driven by an electric motor about the rotational axis of the motor. Generally in such cultivators, the electric motor is positioned close to the cultivator tool. In this manner, the electric motor is exposed to dirt and dust thrown up by the cultivator tool. Moreover, in wet conditions, there is a serious risk of the motor being shorted out due to the accumulation of moisture.

A further problem with such cultivators is that they are subjected to significant torsional shocks when, for example, the cultivator tool encounters a rock or hard ground. The shocks produced in such circumstances may damage the electric motor.

In accordance with the present invention, a rotary cultivator comprises an elongate tubular handle member, a cultivator tool rotatably mounted at one end of the handle member and an electric motor mounted at the other end of the handle member, a flexible drive element extending within the tubular handle member, the flexible drive element being connected at one end to the electric motor and at the other end to the cultivator tool.

25

With the rotary cultivator according to the present invention, the electric motor is remote from the cultivator tool so that the problems with regard to dirt, dust and moisture are avoided. Moreover, the flexible drive between the cultivator tool and the electric motor, will absorb torsional shocks, thereby protecting the motor against damage and the user against injury.

30

According to the preferred embodiment of the invention, the electric motor is provided by a dedicated drive unit, the housing of which is secured to the upper end of the tubular handle member. According to another embodiment of the invention, a portable drill or like appliance, 5 may be used as the drive unit, releasable attachment means being provided at the upper end of the tubular handle member for engagement of the portable drill or like appliance.

The electric motor may be powered from the mains or by means of 10 batteries. According to a further preferred embodiment, the drive unit may have a torque limiting clutch arrangement to further protect the electric motor from torsional shocks.

The handle member may be formed as a single piece but may alternatively 15 be formed from several sections, which may be interconnected in suitable manner, so that the handle may be disassembled for transport and storage purposes.

The cultivator tool preferably has a hub of circular configuration having a 20 plurality of axially extending tine formations, for engagement of the ground.

An embodiment of the invention is now described, by way of example only, with reference to the accompanying drawings, in which:-

25

Figure 1 shows a perspective view of a rotary cultivator in accordance with the present invention;

Figure 2 shows a part sectional view of the rotary cultivator shown in 30 Figure 1;

Figure 3 shows a perspective view of a cultivator tool for the rotary cultivator shown in Figure 1;

Figure 4 shows an alternative embodiment of the invention; and

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Figure 5 shows a perspective view of a motor attachment means of the rotary cultivator illustrated in Figure 4.

As illustrated in Figure 1, a rotary cultivator 10 comprises a tubular handle member 12 with a cultivator tool 14 rotatably mounted to the lower end of the handle member 12 and a cordless electric motor drive unit 16 mounted to the upper end of the handle member 12.

As illustrated in greater detail in Figure 2, the tubular handle member 12 is formed from three sections 18, the sections 18 being interconnected by plastic sleeve members 20 which locate inside the ends of the tubular sections 18. A flexible drive element 22 is located within the handle member 12 and extends from one end of the handle member 12 to the other. The plastic sleeve members 20 act as guides and bearings for the flexible drive element 22. The flexible drive element 22 is of conventional design and may, for example, comprise one or more wires which are wound helically to provide a unidirectional drive element, the drive element 22 being rotated in a direction which will tighten the helical turns. Drive formations 24,26 of non-circular section, for example square section, are provided at each end of the flexible drive element 22.

A bush unit 30 is secured to the lower end of the tubular handle member 12 and is secured thereto in suitable manner, for example by means of one or more set screws 32. An arbor 34 is rotatably mounted in the bush member 30 and is secured axially thereof by means of a shoulder portion 36 and a star washer or circlip 38. The inner end of the arbor 34 has a

socket formation 40 which is drivingly engaged by the drive formation 24 of the flexible drive element 22. A screw threaded bore 42 is provided at the outer end of arbor 34, by which the cultivator tool 14 may be bolted to the arbor 34.

5

A rubber end cap 44 engages over the outer end of arbor 34 and the end of bush unit 30, to provide a seal preventing ingress of dirt and moisture into the bush unit 30 and to retain lubricant in the bush unit 30.

- 10 As illustrated in Figure 3, the cultivator tool 14 comprises a cup-like member having a flange formation 50 with a central aperture 52, through which a bolt 54 may pass, to secure the cultivator tool 14 to the arbor 34. The aperture 52 and bolt 54 may be shaped, for example with a flat, to prevent relative rotation of the cultivator tool 14 with respect to the
- 15 arbor 34. Alternatively, locking tabs may be provided on the flange formation 50 for engagement of flats on the head of the bolt 54 or for engagement of flats on the arbor 34, to prevent relative rotation.

- The cylindrical wall of the cup formation has a series of axially extending
- 20 recesses 56, so as to define a series of angularly spaced axially extending tines 58. The outer edges of the tines 58 are tapered away from the leading edge thereof, to improve the cutting ability of the tines 58.

- According to a further modification, the tines 58 may be twisted in the
- 25 plane of the flange formation 50 from the leading edge to the trailing edge, in order to improve the amount of soil disturbance.

- According to a further modification, the tines of the cultivator tool 14 may be formed independently of the flange formation 50, for example from
- 30 round bar, and secured to the flange formation 50 in suitable manner. By this means, the shape of the tines may be of any desired configuration.

The electric motor drive unit 16 also has an arbor 60 with a socket formation 64 drivingly connected to the electric motor, for engagement of the drive formation 26 at the upper end of the flexible drive 22.

5

In the alternative embodiment illustrated in figure 4, the drive unit 16 is in the form of a cordless portable electric drill 66, the drill 66 is releaseably attached to the upper end of handle member 12 by an attachment assembly 70.

10

As illustrated in figure 5 the drill attachment assembly 70 is secured to the upper end of tubular handle member 12 in suitable manner, for example by means of one or more set screws 72. The drill attachment assembly 70 has a cylindrical housing 74 for engagement of the nose of the drill 66. Formations may be provided on the internal diameter of the housing 74 for engagement of corresponding formations on the nose of drill 66, to locate the drill 66 axially and/or rotationally with respect to the housing 74.

15

20 A pair of toggle latches 78 are provided on the housing 74, the toggle latches 78 having detent formations 80 for engagement of corresponding formations, for example slots 82, on the drill 66, so that the toggle latches 78 may be used to clamp the drill 66 to the housing 74.

25 If the drill 66 has a direction reversing switch 84, a guard 86 may be provided on the housing 74, to prevent actuation of the switch 84 to reverse the direction of rotation from that in which the flexible drive element 22 will operate.

30 Various modifications may be made without departing from the invention.

For example where a portable electric drill is used, the method of attachment of the drill may also be varied, for example the method of attachment may be adapted to utilise features incorporated into the drill design by the drill manufacturer, for attachment of the drill to other tools.

- 5 Moreover, instead of the toggle latches 78, the drill 66 may be clamped to the housing 74 in other ways, for example by means of a strap which extends all the way round the body of the drill 66.

- 10 A grip may be attached to the handle member 12, intermediate of the drive unit 16 and the cultivator tool 14, to facilitate manipulation of the cultivator.

CLAIMS

1. A rotary cultivator comprising an elongate tubular handle member, a
5 cultivator tool rotatably mounted at one end of the handle member and an
electric motor mounted at the other end of the handle member, a flexible
drive element extending within the tubular handle member, the flexible
drive element being connected at one end to the electric motor and at the
other end to the cultivator tool.
10
- 2 A rotary cultivator according to claim 1 in which the electric motor
is provided in the form of a dedicated drive unit secured to the upper end
of the handle member.
- 15 3. A rotary cultivator according to claim 1 in which the electric motor
is provided in the form of a portable drill or like appliance.
4. A rotary cultivator according to claim 3 in which attachment means
is provided at the upper end of the handle member for securing a drill or
20 like appliance to the handle member.
- 5 A rotary cultivator according to claim 4 in which means is provided
for clamping the drill or like appliance to the attachment means.
- 25 6 A rotary cultivator according to any one of claims 3 to 5 in which
the drill or like appliance is connected to the flexible drive by means of a
drive member, the drive member having a socket formation for
engagement of a drive formation on the flexible drive.
- 30 7. A rotary cultivator according to any one of the preceding claims in
which the electric motor is powered by means of batteries

8. A rotary cultivator according to any one of claims 1 to 5 in which the electric motor is powered from a mains supply.

5 9. A rotary cultivator according to any one of the preceding claims in which the electric motor is connected to the flexible drive by means of a torque limiting clutch.

10 10. A rotary cultivator according to any one of the preceding claims in which the cultivator tool comprises a hub with a plurality of tine formations extending in the direction of the axis of rotation of the hub formation.

15 11. A rotary cultivator according to claim 9 in which the cultivator tool comprises a cup like formation, having a flange formation adapted to be secured to the lower end of the flexible drive for rotation therewith, the cylindrical wall of the cup formation having a series of axially extending recesses so as to define a series of angularly spaced tines.

20 12. A rotary cultivator according to any one of the preceding claims in which the cultivator tool is connected to the flexible drive by means of an arbor, the arbor having a socket formation for engagement of a drive formation on the flexible drive and being rotatably mounted in a bush unit secured to the lower end of the handle member.

25 13. A rotary cultivator according to any one of the preceding claims in which the handle member is formed from a plurality of sections, the sections being releasably interconnected by means of sleeve members which engage the ends of adjacent sections.

30 14. A rotary cultivator according to claim 13 in which the sleeve members act as guides and bearings for the flexible drive element

- 9 -

15. A rotary cultivator substantially as described herein, with reference to and as shown in, figures 1 to 5 of the accompanying drawings.

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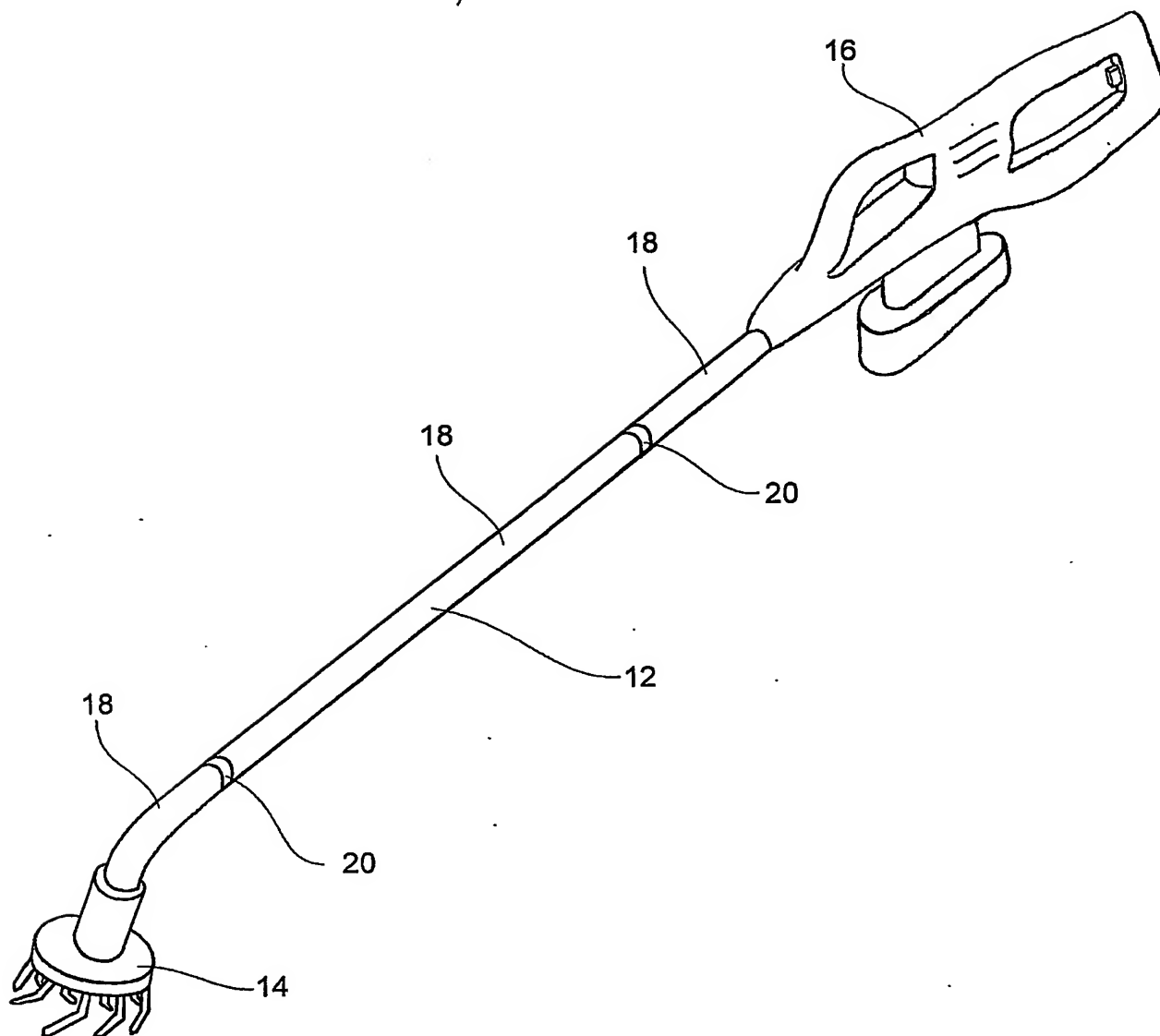


Fig 1.

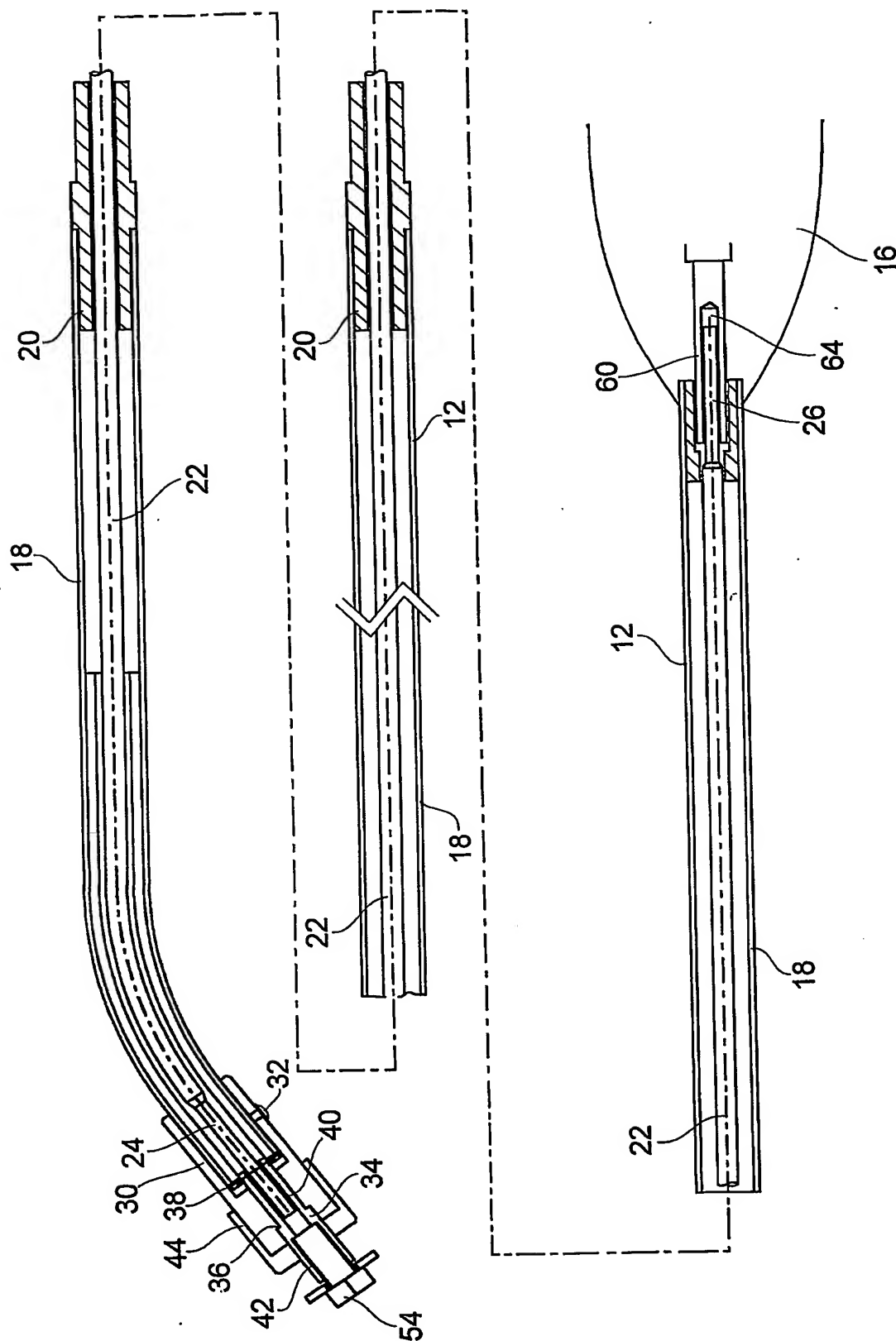


Fig 2.

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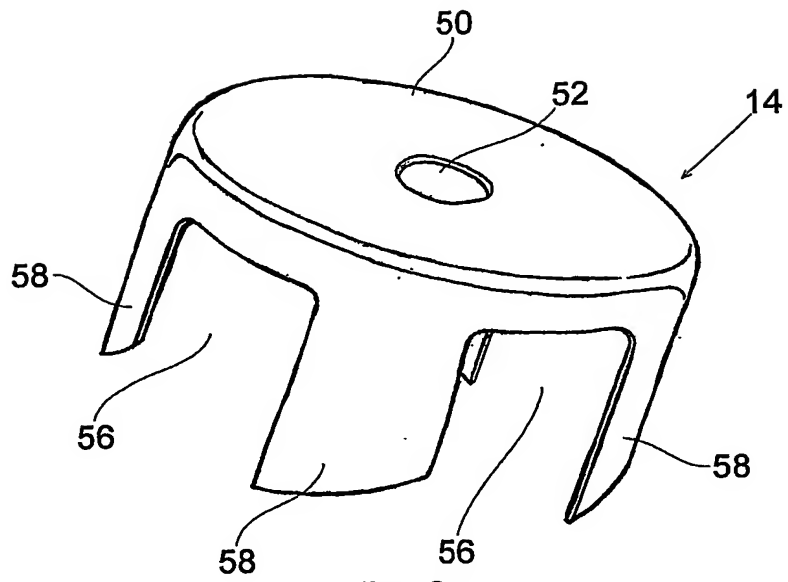


Fig 3.

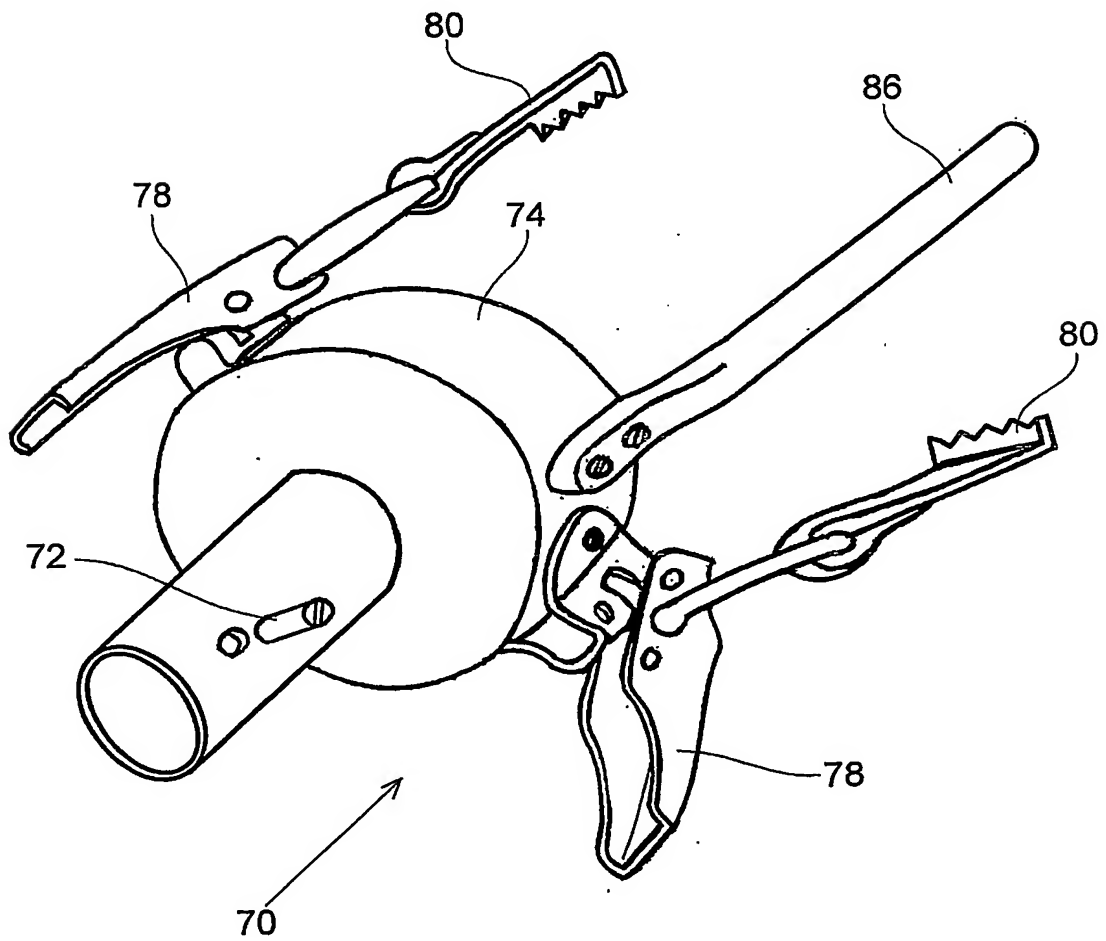


Fig 5.

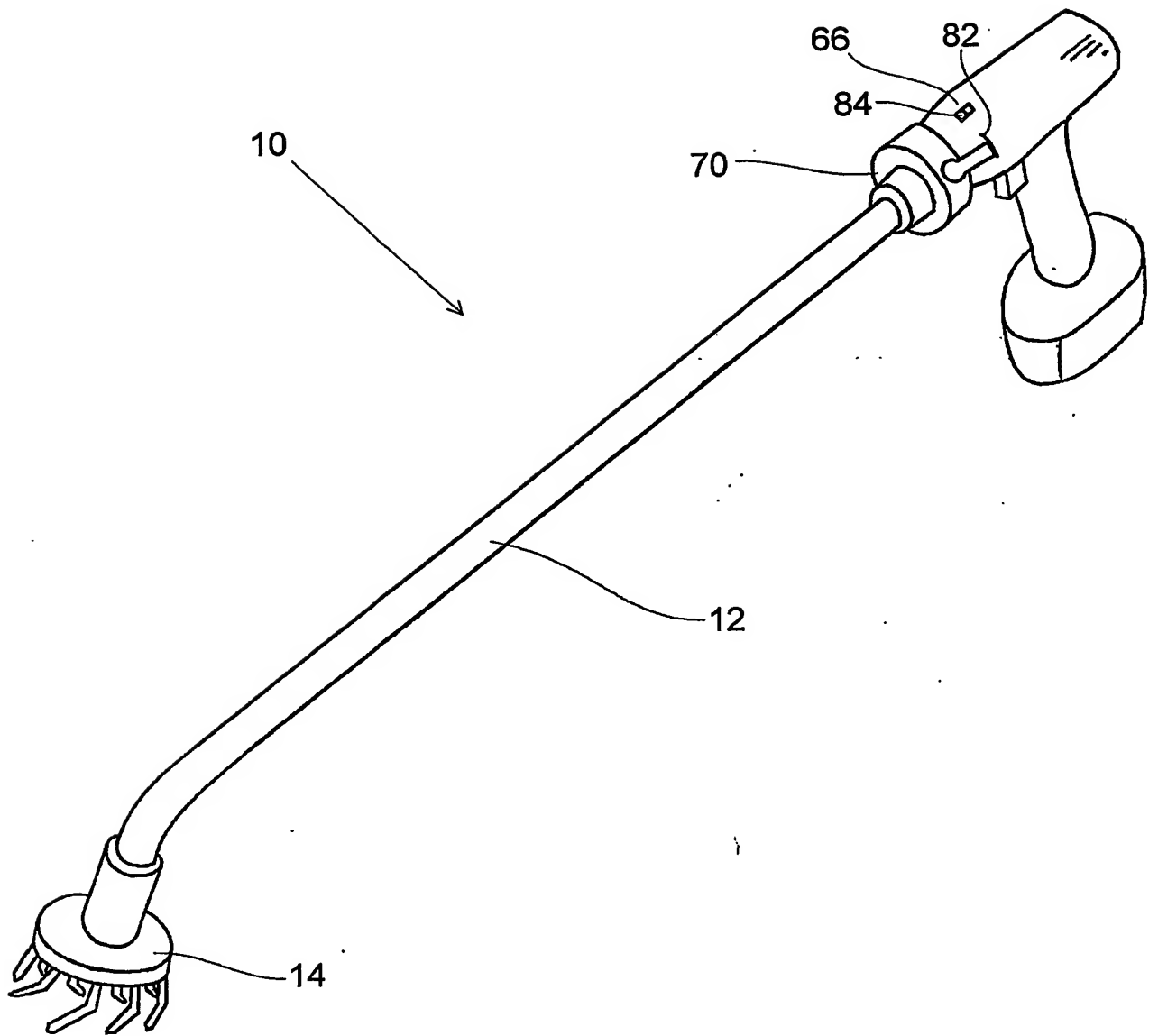


Fig 4.

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